

**REMARKS**

**I. Status and Disposition of the Claims**

Claims 19-42 are pending. By the above amendment, claims 19-41 have been amended to recite, *inter alia*, a "cured pneumatic tire." Claim 42 has been amended to recite, *inter alia*, "at least one reactive substance . . . chemically reacts with the at least one dye substance."

Support for these amendments may be found in the as filed specification and claims. For example, support for the amendment may be found at page 4, lines 27-30 of the as-filed specification, which indicate that "the temperature indicator is applied on the tyre after vulcanization. . . ." See also, page 3, lines 1-4. Similarly, support for the amendment may be found, for example, at page 6, lines 9-25 of the as filed specification. Applicants therefore submit that the above amendments raise no issue of new matter.

Claims 23-28, 35 and 40 are objected to by the Examiner as being dependant from a rejected base claim, but as allowable if rewritten in independent form. However, the Examiner rejects: claim 42 under 35 U.S.C. § 102(b) as anticipated by British Patent No. GB 1,147,875 ("Robert") (Office Action, page 2); claims 19-22, 29, 31-34 and 36-39 under 35 U.S.C. § 103(a) as unpatentable over Canadian Patent No. 781,210 ("Buckland") in view of Robert (*Id.* at 2-4); claim 30 under § 103(a) as unpatentable over Buckland in view of Robert, further in view of U.S. Patent No. 4,155,887 ("Hetson") (*Id.* at 4-5); and claim 41 under § 103(a) as unpatentable over Buckland in view of Robert, further in view of U.S. Patent No. 3,607,498 ("Kubota") (*Id.* at 5).

Applicants acknowledge with appreciation the Examiner's indication of allowable subject matter. Applicants maintain, however, that all of the present claims are patentable for at least the following reasons.

## **II. Response to Claim Rejections**

### **A. § 102(b) rejection of claim 42**

The Examiner asserts that Robert anticipates each and every element of claim 42. Office Action, page 2. Applicants respectfully disagree with and traverse this rejection for at least the following reasons.

To establish anticipation under 35 U.S.C § 102, the Examiner must demonstrate that a reference teaches each and every element of a claim. See M.P.E.P § 2141. For at least the following reasons, the Examiner has failed to meet this burden.

Present claim 42 recites a temperature indicator that comprises, *inter alia*, "at least one reactive substance; and at least one dye substance; wherein . . . the at least one reactive substance is heated above the threshold temperature and chemically reacts with the at least one dye substance so as to modify the at least one characteristic peak" of the dye.

Robert discloses a temperature indicating paint comprising a melt sensitive component and a dye and/or fluorescent material soluble in the melt sensitive component when melted. Robert, page 1, lines 28-34. As exemplary dye and fluorescent materials suitable for this purpose, Robert lists "Umbelliferone" and "Nigrosine." *Id.* at page 1, lines 82-85 & page 2, lines 5-10. Robert does not, however, disclose the precise mechanism driving the color change, beyond specifying that the

color change occurs upon melting of the melt sensitive component and that the melt sensitive component undergoes a change in crystalline structure. *See id.* at page 1, lines 11-19 & 34-41. The change is “permanent upon subsequent cooling of the paint to room temperature.” *Id.* at page 2, lines 16-18. Robert does not disclose a temperature indicator comprising at least one dye substance that **chemically** reacts **with** at least one reactive substance.

In the present case, Applicants submit that Robert’s disclosed paint exhibits a change in color as a result of a physical, not chemical, reaction by the dye and certainly not a chemical reaction between the dye and melt sensitive material, and thus is different from the claimed temperature indicator. As noted above, Robert discloses that the disclosed temperature indicator changes color upon melting of the melt sensitive component. *Id.* at page 1, lines 34-41.

As mentioned, Robert discloses the use of Umbelliferone and Nigrosine. Robert reports that a composition comprising Umbelliferone and palmitic acid (as a melt sensitive component) exhibits a permanent change in florescent properties upon melting of the palmitic acid. *See* Robert, page 2, lines 10-15. Applicants understand that this change is most likely due to the change in the crystalline structure of the Umbelliferone as it dissolves in the molten palmitic acid. The destruction of the crystalline structure of Umbelleferone is not, however, a chemical reaction. Rather it is a physical reaction, because no actual chemical modification is made to the structure of the dye molecules. And no chemical modification is made with the palmitic acid. Similarly, Applicants understand that the Nigorsine undergoes a change in physical form when it dissolves in the molten phenacetine melt sensitive component. *See id.* at page 1, lines 79-84

The present invention, on the other hand, is directed towards temperature indicators that exhibit a color change as a result of a **chemical** reaction **with** the at least one reactive substance. See Claim 42.

For at least the foregoing reasons, Robert does not teach a temperature indicator meeting each and every element of present claim 42. Thus, the § 102(b) rejection of this claim as anticipated by Robert is improper, and should be withdrawn.

**B. § 103(a) rejection of claims 19-22, 29, 31-34 and 36-39**

According to the Examiner, Buckland teaches each and every element of present claims 19-22, 29, 31-34 and 36-39, except for the claimed temperature indicator comprising at least one reactive substance and at least one dye. Office Action, pages 2-3. To remedy this deficiency, the Examiner turns to Robert. *Id.* Noting that Robert discloses temperature indicating paints and that Buckland mentions that such paints may be useful, the Examiner asserts that “one of ordinary skill in the art at the time of the invention would have found it obvious to use a wide variety of temperature indicating paints, including the temperature indicating paint of Robert. . . .” so as to arrive at the claimed invention. *Id.* at 3. Applicants respectfully disagree.

To establish a prima facie case of obviousness under § 103, the Examiner must show that three basic criteria have been met. See M.P.E.P. § 2143. Specifically, the Examiner must establish: (1) that the prior art teaches or suggests all of the elements of a claim; (2) that there is some teaching or suggestion in the prior art to make a proposed modification; and (3) that one of ordinary skill in the art would have had a reasonable expectation of success in making the asserted modification. *Id.* For at least

the following reasons, the Examiner has failed to establish that Buckland and Robert teach or suggest each and every element of claims 19-22, 29, 31-34, and 36-39.

Claim 19 recites, *inter alia*, “[a] cured pneumatic tyre, comprising: at least one temperature indicator . . . wherein, when an excess temperature is reached in the cured pneumatic tyre . . . .” Claim 19. Neither Buckland nor Robert, however, teach or suggest the use of a temperature indicator to indicate an excess temperature being reached in a cured pneumatic tire, as claimed.

Buckland is drawn towards the use of temperature indicators as a means for determining whether, during production, a **green** (i.e., uncured) tire is exposed to heat sufficient to cure the rubber making up the tire. See Buckland, page 4, lines 10-25. Specifically, Buckland employs a strip of temperature indicating material during the formation of a tire. *Id.* at page 6, line 28-page 7, line 5. If the indicator is exposed to a desired temperature (e.g., a desired curing temperature) it changes color, thereby allowing operators to easily determine if satisfactory curing of the tire has occurred. *Id.* at page 6, line 28-page 7 line 5. Buckland does not, however, teach or suggest the use of the disclosed temperature indicator in a *cured* pneumatic tire, as claimed. See, e.g., claim 19. Robert does not cure the deficiencies of Buckland. Robert does not teach or suggest that its material is suitable for a tire, either when green as in Buckland or when cured as in the present claims.

Further, the combination of the temperature indicator of Robert with the system/ process of Buckland cannot result in a tire that can indicate an excess temperature being reached in the cured pneumatic tire, as required by the claims. As mentioned above, Robert is drawn towards a temperature indicating paint that exhibits a

permanent color change upon melting of a melt sensitive component. See Robert, page 2, left column, lines 15-21 (emphasis added). That is, once the paint is exposed to sufficient to melt the melt sensitive component, an irreversible color change is effectuated. *Id.* Thus, upon curing of the hypothetical green tires resulting from the proposed combination of Buckland and Robert, the temperature indicator of Robert would undergo an *irreversible* color change such that it could not indicate at any future time whether or not the cured tire reached an excess temperature, as required by the claims. Nothing in Buckland or Robert suggests modifying Buckland to add the paint at a later time to measure temperature changes in a cured tire, since the purpose of the paint in Buckland is to monitor the vulcanization process. Buckland, page 6, line 28- page 7 line 5.

For at least the foregoing reasons, Robert and Buckland, alone or in combination, do not teach or suggest each and every element of present claims 19-22, 29, 31-34, and 36-39. Further, Robert and Buckland provide no teaching or suggestion that would have motivated one of ordinary skill in the art at the time the invention was made to modify the disclosure of these references so as to arrive at the claimed invention, with a reasonable expectation of success. Therefore the § 103(a) rejection of these claims as unpatentable over Buckland in view of Robert is improper, and should be withdrawn.

**C. § 103(a) rejection of claim 30**

The Examiner rejects claim 30 under § 103(a) as unpatentable over Buckland, Robert and Hetson for the reasons disclosed on pages 4-5 of the Office Action.

Although Hetson may disclose other aspects of the claimed invention, it does not remedy the deficiencies of Buckland and Robert discussed above. Specifically Hetson, like Buckland and Robert, fails to teach or suggest a *cured* pneumatic tire comprising a temperature indicator, as claimed.

Thus, the § 103(a) rejection of claim 30 as unpatentable over Buckland, Robert and Hetson is improper, and should be withdrawn.

**D. § 103(a) rejection of claim 41**

The Examiner rejects claim 41 under § 103(a) as unpatentable over Buckland, Robert and Kubota for the reasons disclosed on page 5 of the Office Action. Although Kubota may disclose other aspects of the claimed invention, it does not remedy the deficiencies of Buckland and Robert, as discussed above. Specifically Kubota, like Buckland and Robert, fails to teach or suggest a *cured* pneumatic tire comprising a temperature indicator, as claimed.

Thus, the § 103(a) rejection of claim 30 as unpatentable over Buckland, Robert and Kubota is improper, and should be withdrawn.


**III. Conclusion**

In view of the foregoing amendments and remarks, Applicants respectfully request reconsideration of this application and the timely allowance of the pending claims. Please grant any extensions of time required to enter this response and charge any additional required fees to our Deposit Account No. 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,  
GARRETT & DUNNER, L.L.P.

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By:   
Anthony A. Hartmann  
Reg. No. 43,662